

## REMARKS

The Examiner is thanked for the careful examination of the application. However, in view of the foregoing amendments and the following remarks, the Examiner is respectfully requested to reconsider and withdraw the outstanding rejections.

Claims 1, 7, 9, 12, and 21 are amended, and claim 27 is cancelled. New claims 28 – 35 are added.

## DOUBLE PATENTING:

Claims 1, 2, 4 – 14, 16 – 25, and 27 are rejected on the ground of obviousness-type double patenting over claims 1 – 42 of U.S. Patent No. 5,305,737, hereinafter *Vago '737*.

The independent claims 1 and 19 each includes the feature that the electrical signal generator used to generate stable cavitation in the water is at least partially rectified. In contrast to the pending claims, the system in *Vago '737* attempts to maintain stable cavitation by adjusting the DC bias that is applied to the ultrasound generating signal. See column 12, lines 10 – 16 and 28 – 33. The prior art system of *Vago '737* required unvarying bubble linearity, adjustable repeatable bubble linear cavitations, and stable bubble dynamics. In other words, it only works well if there are ideal conditions in the water, which only prevail at impractically low applied pressures.

Vago '737 does not teach or suggest using a partially rectified waveform, which is now set forth in claims 1 and 19. Accordingly, claims 1 and 19 are patentable over Vago '737.

Claims 2, 4 – 14, and 16 – 25 depend from either claim 1 or claim 19, and are thus also patentable over Vago '737 at least for the reasons set forth above with regard to the independent claims. Claim 27 is cancelled.

Claims 19 – 25 and 27 are rejected on the ground of obviousness-type double patenting over claims 1 – 10 of U.S. Patent No. 5,665,141, hereinafter Vago '141.

Claims 19 – 25 each includes a step of energizing a transducer **with periods of full-wave compression and rarefaction cycles alternating with periods of rectified-wave compression pressure cycles** sufficient to suppress inertial or transient cavitation for a predetermined interval.

In contrast to the pending claims, the system in Vago '141 attempts to maintain stable cavitation by adjusting the DC bias that is applied to the ultrasound generating signal. See column 11, lines 36 - 42 and 53 – 58. The prior art system of Vago '141 required unvarying bubble linearity, adjustable repeatable bubble linear cavitations, and stable bubble dynamics. In other words, it only works well if there are ideal conditions in the water, which only prevail at impractically low applied pressures.

Vago '141 does not teach or suggest energizing a transducer with periods of full-wave compression and rarefaction cycles alternating with periods of rectified-wave compression pressure cycles, which is set forth in claims 19 - 25 and 19. Accordingly, claims 19 - 25 are patentable over Vago '737. Claim 27 is cancelled.

**ART REJECTIONS:**

Claims 1, 2, 4 – 14, 16 – 25, and 27 have been rejected under 35 USC 102(b) as being allegedly anticipated *Vago '141*.

In response thereto, claims 1, 2, 4 – 14, 16 – 18 have been amended to clarify that the electrical signal generator is operatively connected to the transducer for energizing same with an alternating electrical signal that is at least partially rectified to generate stable cavitation in the water contained in the tank. Claims 19 – 25 each includes a step of energizing a transducer ***with periods of full-wave compression and rarefaction cycles alternating with periods of rectified-wave compression pressure cycles*** sufficient to suppress inertial or transient cavitation for a predetermined interval.

In contrast to the pending claims, the system in *Vago '141* attempts to maintain stable cavitation by adjusting the DC bias that is applied to the ultrasound generating signal. See column 11, lines 36 - 42 and 53 – 58. The prior art system of *Vago '141* required unvarying bubble linearity, adjustable repeatable bubble linear cavitations, and stable bubble dynamics. In other words, it only works well if there are ideal conditions in the water, which only prevail at impractically low applied pressures.

*Vago '141* does not teach or suggest an electric signal generator that is operatively connected to the transducer for energizing the same with an alternating electrical signal that is at least partially rectified to generate stable cavitation. It also does not teach or suggest energizing a transducer ***with periods of full-wave compression and rarefaction cycles alternating with periods of rectified-wave***

**compression pressure cycles.** Accordingly, claims 1, 2, 4 – 14, 16 – 25 are patentable over *Vago '141*. Claim 27 is cancelled.

Contrary to the Examiner's assertion at the top of page 4 of the Official Action, *Vago '141* is completely silent with regard to a "rectified/full duty cycle" at column 8, lines 1 – 6. In the event that the Examiner maintains the rejection over *Vago '141*, the Examiner is respectfully requested to explain the analysis of column 8, lines 1 – 6.

Claims 3, 15, and 26 are rejected under 35 USC 103(a) as being allegedly unpatentable over *Vago '141* in view of USP 6,036,644. However, the Examiner relies on USP 6,036,644 only for an alleged teaching of a venturi injector. However, that teaching does not overcome the deficiency of the rejection based on *Vago '141*. Accordingly, claims 3, 15, and 26 are also patentable.

New claim 28 is allowable over the art of record at least because it defines a sensor in the water contained in the tank and a microprocessor for (a) receiving signals from the sensor, (b) determining the presence of inertial or transient cavitation based on the received signals, and (c) sending an electrical signal generator to the transducer for energizing the transducer with an alternating electrical signal to generate stable cavitation in the water contained in said tank based on the determinations of the microprocessor.

The new dependent claims are allowable at least for the reasons set forth above with respect to the independent claims from which they depend.

Accordingly, in view of the foregoing remarks, the Examiner is respectfully requested to reconsider and withdraw all pending rejections and to allow the present application.

In the event that there are any questions concerning this response, or the application in general, the Examiner is encouraged to telephone the undersigned so as to expedite examination of the application.

Respectfully submitted,

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